

computer system 26 includes a central processing unit 32, a power supply 34 and a visual display unit 36 and optionally a network connection 38. The computer system 26 includes a database of all the tools stored in the cabinet 2.

[0078] An inventory control process carried out using the system described above will now be described with reference to FIG. 9. First, a user (for example a technician or a mechanic) identifies him or herself 40 by entering a PIN or using a swipe card. The identity of the user is checked against a list of authorised users held on the computer system 26 and if authorisation of the user is valid, the lock 30 to the tool cabinet is unlocked 42, allowing the user to gain access to the tools. At the same time, the identity of the user and the time are recorded 42 in the computer system 26 database. If the identity of the user is not validated as that of an authorised user, the tool cabinet 2 remains locked, preventing access to the tools. Optionally, a warning may be sent to the computer system 26 to indicate that an unauthorised person has attempted to gain access.

[0079] Assuming that the identity of the user has been validated, the user then opens one of the drawers 6a-6d. The user then removes 44 the required tools from the cabinet 2. As this takes place, for each of the tools removed, the sensor 12 associated with the recess 10 sends the received signals to the computer system 26 via the computer device 13. The computer system 26 determines which tools have been removed by the association of the sensor 12 with the recess and a database of tools associated with the recesses. This information is recorded 46, together with the time of removal and a user identifier. After the user has closed the cabinet, after a short delay, the cabinet relocks automatically and the registered user is signed off 50.

[0080] After completing the assigned task, the user re-enters his/her ID 40, and once this has been verified, the cabinet unlocks 42 and the identity of the user is registered on the computer system 26. The user opens the appropriate drawer 6a-6d, replaces 52 each of the tools in the cabinet and closes the drawer. For each tool that is replaced, the sensor 12 sends signals to the computer system 26 for identification, and another entry is made in the database 54, identifying replacement of the tool, the time and the identity of the user. If the computer system 26 determines that no tools have been replaced, it issues an alert 60, which enables a supervisor to investigate the incident.

[0081] The user then closes the cabinet and is logged off 58.

[0082] The computer 26 therefore records which tools are in use, who has taken them and the time at which the tools are removed and returned. Using this information it is a simple matter for a supervisor to check whether all the tools are present in the cabinet and, if any are missing, who has taken them and when. The supervisor can also check that the tools taken for a particular task are appropriate for that task. Checks can be carried out by the supervisor whenever required or they can be instigated automatically, for example whenever the cabinet is closed. In addition the tool cabinet can be checked visually at regular intervals, to ensure the full complement of tools is present and that the automatic system is operating correctly. The computer 26 can also keep a continuous log of how long each tool has been in use, which may be useful for tools and measuring instruments such as torque wrenches that have to be recalibrated at preset intervals. The supervisor can also use the information as part of a schedule management system, which assigns an amount of time to a particular task. If the tool is not returned within a certain period an alert can

be issued. This can provide an early indication that a tool is missing or that a particular job is overrunning. The system can also be programmed to disregard the absence of tools that have been removed deliberately for repair or replacement. The computer can also keep a continuous log of how long each tool has been in use, which may be useful for tools and measuring instruments such as torque wrenches that have to be recalibrated at preset intervals. It can also be programmed to disregard the absence of tools that have been removed deliberately for repair or replacement.

[0083] It may be noted that although the system checks for the presence of a tool in each of the sensed recesses, it does not check that the correct tool has been placed in each recess. In fact, since in the embodiment described above the detectors are simple magnetic detectors, it would be relatively easy to mislead the detection system, for example by placing a steel bolt in one of the recesses instead of the correct tool. This is not considered to be a serious disadvantage, since the main aim of the system is to ensure that trusted personnel do not accidentally forget to return tools to the container after use, rather than preventing deliberate theft. However, it is worth noting that since the system also records who has taken each tool from the container, this will deter deliberate theft, particularly if regular visual inspections of the cabinet are also carried out.

[0084] If necessary, the system can be adapted to include more sophisticated sensors that are capable of detecting the presence of individual tools, for example by detecting identification tags attached to the tools. However, this is generally less preferred, since it increases the cost and complexity of the system and gives rise to other disadvantages, such as the difficulty of attaching tags to the tools and the risk of the tags becoming detached during use. The simple system described first is likely therefore to be preferred in many situations.

[0085] Various other modifications of the inventive aspects described herein are, of course, possible. For example, instead of using magnetic sensors to detect the presence of tools in each of the recesses, other types of sensor such as optical sensors or mechanical switches may be used. Alternatively, instead of providing a separate sensor for each recess, the cabinet may include an array of optical sensors mounted above each drawer, which scan the drawer as it is opened, in a manner similar to a conventional optical scanner. An image of the drawer can then be generated, which can be compared with previous images to sense the removal of tools from the recesses or their replacement in the recesses. Alternatively, instead of optical sensors, an array of magnetic sensors can be used to scan the drawer as it is opened. Other systems such as a camera system and image recognition software; a camera system and optical character recognition software; or barcode reading devices can be used to monitor the removal and replacement of tools from the recesses.

[0086] The tool container may also take different forms: for example it may consist of a box with a single layer of tools, or with tools in removable trays, or it may take the form of a cupboard or a board on or within which the tools are hung, or any other suitable form. The tools may also of course be of any kind, including engineering tools, surgical tools and so on. The above described features and aspects may also be adapted to other non-tool applications where an inventory control system is required, and references within this specification to tools should be construed accordingly to include